methyl nonyl ketone

Review Date: 06/10/2013
CAS #: 112-12-9

Type	Animal repellant
Controls	Products are used as a repellant or training aid for dogs and cats (also repels iris borers).
Mode of Action	Confuses animal's sense of smell which repels them from the treated area.

Thurston County Review Summary:

Methyl nonyl ketone is an active ingredient found in cat, dog, and iris borer repellants. It is low in toxicity to animals although broadcast applications of the granular products can result in enough chemical available to birds to cause toxicity or death. Non-granulated products (powders or liquids) do not pose the same risk to birds, animals, or humans. When a product in one form poses a high hazard and other products in a different form (with the same active ingredient) pose a low hazard, the resulting rating is conditional.

MOBILITY

Property	Value	Reference	Value Rating
Water Solubility (mg/L)	18	1	Moderate / low
Soil Sorption (Kd=mL/g)	Value not found		
Organic Sorption (Koc=mL/g)	2,480	1	Moderate

Mobility Summary:

Methyl nonyl ketone is not very soluble in water and adheres moderately to soil. The hazard for methyl nonyl ketone to move off the site of application with rain or irrigation water is rated moderate.

PERSISTENCE

Property	Value	Reference	Value Rating
Vapor Pressure (mm Hg)	0.04	1	Low
Biotic or Aerobic Half-life (days)	<1	1	Low
Abiotic Half-life (days)	Value not found		
Terrestrial Field Test Half-life (days)	Value not found		
Hydrolysis Half-life (days)	Stable	2	High
Anaerobic Half-life (days)	Value not found		
Aquatic Field Test Half-life (days)	Value not found		

Persistence Summary:

Methyl nonyl ketone in liquid products will dissipate into the air after application and break down quickly in soil, whereas, granular products will degrade slowly until they become wet. Because methyl nonyl keytone is expected to degrade or dissipate to half of the applied concentration in less than one week, the hazard for persistence is rated low.

BIOACCUMULATION

Property	Value	Reference	Value Rating
Bioaccumulation Factor	Value not found		
Bioconcentration Factor	Value not found		
Octanol/Water Partition Coefficient	log Kow = 4.2	1	Moderate

Bioaccumulation Summary:

The octanol/water partition coefficient (log Kow = 4) indicates that methyl nonyl ketone may bind to fish or animal tissue and accumulate. Without an animal metabolism study or bioconcentration test to see if fish remove the chemical when moved to clean water, the hazard rating for bioaccumultation is moderate.

ACUTE WILDLIFE TOXICITY VALUES and Risk Assessment

Test Subject	Value	Reference	Value Rating
Mammalian (LD50)	>5,000 mg/kg	1	Low
Avian (LD50)	>2,250 mg/kg	1	Low
Honey bee or insect (LD50)	Value not found		
Annelida -worms (LC50)	Value not found		
Fish (LC50)	3 mg/L	1	Moderate
Crustacean (LC50)	0.54 mg/L	1	High
Mollusk (LC50)	Value not found		
Amphibian (LD50 or LC50)	Value not found		

Acute Toxicity Testing and Ecotoxicity Summary:

Single-dose toxicity testing indicates that methyl nonyl ketone is low in toxicity to animals and birds, moderately toxic to fish, but highly toxic to some aquatic invertebrates (Reference 1). Risk to birds exceeds the EPA's level of concern for granulated products used at the highest use rates. The risk is expected to be very conservative since the value used was not based on a true LD50 value (lethal dose to 50% of the birds tested). The risk is for the ingestion of granular products and does not necessarily represent the risk associated with liquid or wettable powder products. There were no risk assessments for ingestion of treated vegetation to compare the risk from the different types of products. If a more accurate level of concern is established by further toxicity testing, the risk to birds may be adjusted accordingly. Since the data shows that birds can consume a potentially lethal dose within one square foot of treated area, the hazard to birds is rated high. Indoor uses of methyl nonyl ketone products will not create risk to birds, therefore indoor uses are rated low in hazard (because no mammalian toxicity has been identified).

The EPA determined that because methyl nonyl ketone is not expected to be very mobile in the environment and relatively short lived, that it is not likely to adversly effect aquatic organisms (Reference 1). Risk to animals is considered minimal because the products are intended to repel animals and if ingested, the concentration that may cause toxicity would have to be greater than 1,000 mg/kg/day - which is a very high dose and unlikely to be reached in the environment (Reference 1).

ACUTE HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Applicator exposures were not evaluated						
Post-application exposures were not evaluated						
Post-application exposures were not evaluated						
Combined exposures were not evaluated						

Acute Toxicity Risk Assessment Summary:

The EPA determined that there does not need to be assessments for applicator exposures or post-application exposures because there was not toxicity observed in animal testing (therefore no dose of concern could be established). Potential short-term human exposures to methyl nonyl ketone from repellant use is rated low in hazard.

CHRONIC HUMAN TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	Evaluation not found			
Mutagenicity	up to 0.3 uL/mL	No adverse effects	1	Low
Neurotoxicity - (NOAEL)	Value not found			
Endocrine Disruption	Not listed	- -	3	Low
Developmental Toxicity (NOAEL)	>1,000 mg/kg/day	No toxicity	1	Low
Reproductive Toxicity (NOAEL)	Value not found			
Chronic Toxicity (NOAEL)	>1,000 mg/kg/day	No toxicity	1	Check risk

Chronic Toxicity Hazard Summary:

In toxicity testing, methyl nonyl ketone did not produce toxicity to test animals or to developing fetuses up to the highest dose tested (Reference 1). Mutagenicity testing did not produce any adverse effects (Reference 1). Carcinogenicity evaluation was not found, although lack of a toxic effect from short-term and intermediate-term exposures indicates that methyl nonyl ketone is not carcinogenic at environmental concentrations from repellant uses.

CHRONIC HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Applicator exposures were not evaluated						
Post-application exposures were not evaluated						
Post-application exposures were not evaluated						
Combined exposures were not evaluated						

Chronic Toxicity Risk Assessment Summary:

Due to lack of observed toxicity in animal testing, risk from long-term exposures was not evaluated by the EPA.

Metabolites and Degradation Products:

In soil, methyl nonyl ketone will be metabolized to: carbon dioxide, 4-hydroxy-2-undecanone; 10-hydroxy-2-undecanone; 2,4-undecanone; 2,10-undecanone and; 4-hydroxypentanoic acid (Reference 1).

Comments:

Methyl nonyl ketone is considered a mild eye and skin irritant (EPA Toxicity Category III) and a weak skin sensitizer (Reference 1).

References

1. USEPA. Prevention, Pesticides and Toxic Substances. EPA 738-R-95-038.Reregistration Eligibility Decision (RED) Methyl Nonyl Ketone. July 1995.
2. International Union of Pure & Applied Chemistry. Pesticide Properties Database. Methyl nonyl ketone. Data accessed 6/13/2013.
3. Illinois EPA. "Endocrine Disruptors Strategy" February 1997.
4. Scorecard - The Pollution Information Site. Health Effects / Endocrine Toxicants (Accessed 6/19/2013). Http://www.scorecard.org/health-effects/